ENVIRONMENTAL PERMIT VARIATION APPLICATION

SUPPORTING STATEMENT

TRECATTI LANDFILL SITE
FOCHRIW ROAD
MERTHYR TYDFIL
GLAMORGAN
CF48 4AB

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TRECATTI LANDFILL SITE, FOCHRIW ROAD, MERTHYR TYDFIL

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1.0 INTRODUCTION

1.1 Scope

1.1.1 Sirius Environmental Limited (Sirius) has been commissioned by Biffa Waste Services Limited to prepare an application to vary the existing landfill operations authorised under Environmental Permit EPR/RP3733PC.

1.1.2 The changes specifically relate to the monocell that is currently permitted to received Stable Non-Reactive Hazardous Waste (SNRHW) in the form of asbestos containing waste materials only, with cover provided in the form of inert wastes. There are no changes proposed to the main non-hazardous landfill operations or the Multipurpose Waste Treatment and Remediation Pad (MWTRP) that are also permitted at the site. Waters that have percolated through the waste deposits in the monocell will be continue to be extracted for discharge, but will instead be treated within the on-site leachate treatment plant prior to discharge to sewer.

1.2 Background

1.2.1 Trecatti Landfill Site is approximately 3km west of Rhymney at National Grid Reference SO 082077, as shown in **Drawing No. BF4957/10/01**. It is located within an area of historic open-cast coal and ironstone working and lies to the north-west of the Gelligaer and Merthyr Common. The site is immediately surrounded by common land that includes vegetated colliery spoil tips and is used for rough grazing. The nearest residential area is Dowlais Top which lies approximately 200 metres to the northwest of the landfill. Access to the site is from the unclassified Fochriw Road to the east. The main watercourses present in the vicinity are the River Taff and Rhymney River, which flow in a general southerly direction 3.5km west and 2.1km east of the site respectively.

1.2.2 The permitted installation includes all areas of the existing and proposed landfill and site infrastructure in addition to the landfill gas utilisation and leachate treatment plants. The following non-listed directly associated activities are also included as part of the permitted installation: discharge of treated leachate to sewer; discharge of surface water drainage to a controlled watercourse; and gas flaring.

1.2.3 Merthyr Tydfil Borough Council commenced landfilling at Trecatti in 1986 and operated the site up until 1992 when the management transferred to Biffa Waste Services Limited. The site was licensed at that time to receive domestic, commercial and industrial wastes including difficult and special wastes. Engineered containment principles were introduced at Trecatti from 1993 in Phase 1 within the north-western corner. Subsequent landfilling took place within Phase 2, which then formed the basal containment for Phases 2A, 3A, and 4A. Phase 2A also forms the basal containment for all the remaining 7 Phases to be developed. The approved landfill development layout is illustrated in **Drawing No. BF4857/10/03.**

1.2.4 Trecatti Landfill has been constructed above the regional groundwater table of the Coal Measures strata and therefore no permanent groundwater management system is required. However, temporary underliner drainage systems have been installed beneath the phases developed to date due to the presence of perched groundwater. Leachate accumulating within the site is abstracted and treated at the on-site treatment plant. Landfill gas is collected and pumped to an on-site gas management plant with surplus gas flared off.

1.2.5 The landfill is also permitted to allow the deposit of asbestos containing wastes within a dedicated cell constructed on the engineered southern side slope area of the landfill. The deposit of stable Non-Reactive Hazardous Wastes (SNRHW) including asbestos, was previously authorised through the original PPC permit issued for the site but was removed by a permit holder-initiated application in December 2007. Conditions stated in the permit allow asbestos containing waste materials to be accepted at Trecatti Landfill Site in accordance with stringent regulatory standards.

1.2.6 This permit includes permitted waste activities associated with an onsite MWTRP.

1.2.7 The MWTRP allows the following permitted waste treatment and processing activities to take place:

- Waste Treatment Facility (WTF) – treatment and bioremediation of hazardous and non-hazardous waste including soils and sludges; and
- Green Waste Composting Facility (GWCF).

1.2.8 The MWTRP comprises a single impermeable surfaced pad. The northern most part of the pad is used for the composting of green waste at approximately 3,250m². Adjoining this is an area used for the bioremediation of contaminated soils or sludges, with a footprint of approximately 6,000m². Each area is separated by a low-level bund. The MWTRP site infrastructure is located in the southern area of the site which includes two process water tanks (within a bunded enclosure), a biofilter, air/water separators, attendant process equipment and a substation. The area to the west is used for processing green waste and compost. Additionally, there are two surface water drainage lagoons; one located within the southern part of the site and the other within the north-eastern part of the site.

1.2.9 A composting facility permitted under Standard Rules Permit set SR2012 No. 8 is also authorised to operate on the multipurpose pad.

1.2.10 The most recent variation of the permit (Ref.: EPR/RP3733PC/V011) introduced an asbestos picking station and appropriate European Waste Codes (EWC) to allow the onsite acceptance, transfer and processing of asbestos contaminated soils and fire damaged wastes (contaminated with or without hydrocarbons).

1.3 Site Setting

1.3.1 Trecatti Landfill is located at NGR SO 082 077 to the immediate north-east of Merthyr Tydfil and approximately 3km west of Rhymney. The site is developed within void created by historical, open-cast coal and ironstone mining. It currently comprises of two areas of landfilling; the historic landfill to the north-east (the “Merthyr Waste Area”), and an area of artificially engineered containment landfilling to the west.

1.3.2 The site lies within an area of relatively elevated ground, with the topography falling towards the west and east, towards the Taff and Rhymney valleys respectively. The main surface water courses present in the vicinity of the site are the River Taff and Rhymney River, which flow in a general southerly direction, passing 3.5km to the west and 2.1km to the east of the site respectively. A number of tributary drains and streams drain the land immediately surrounding Trecatti Landfill.

1.4 Summary of Variation Application Requirements

1.4.1 The primary aims of the this application include:-

- The extension of Schedule 2 Table S2.4 of the permit to include additional waste codes that are classified as Stable Non-Reactive Hazardous Wastes (SNRHW); and
- Extend the hazardous characteristics displayed by wastes imported under waste codes 17 05 03 and 19 13 01, limited to inorganic substances only; and
- The discharge of treated waters/leachate from the SNRHW monocell to sewer following initial treatment in the on-site Leachate Treatment Plant (LTP)

1.4.2 The details of the application have been discussed with the facility's Local Area Officer from Natural Resources Waste (NRW), Richard Taylor, as part of pre-application consultation held in the latter part of 2019. A copy of the original correspondence summarising the application proposals and the Compliance Assessment Report (CAR) acknowledging the discussions held on site in December 2019 is included in **Appendix 1**. As part of the pre-application consultation, it was confirmed that the application would constitute a 'Minor' Variation. An application fee of £1,311 therefore accompanies this application.

2.0 VARIATION REQUIREMENTS

2.1 Additional Waste Codes

2.1.1 It is sought to increase the range of waste permitted for disposal in the monocell, as currently listed in Schedule 2 Table S2.4 of the permit. The current list is limited to asbestos containing waste materials, including asbestos contaminated soils from construction and demolition sources and the on-site Soils Treatment Facility (STF).

2.1.2 Details of the additional waste codes and descriptions to be added to Schedule 2 Table S2.4 of the permit are presented in **Appendix 2.** Many of these relate to the hazardous mirror entries to the non-hazardous entries already permitted for disposal within the main non-hazardous landfill void, although they will not consist of organic/biodegradable wastes streams. Further details relating to the waste acceptance criteria for the additional waste streams are discussed in **Section 2.3**. Note, all additional codes consist of solids and sludges only.

2.2 Extension of Wastes Imported Under Existing Waste Codes

2.2.1 It is also sought to extend the scope of hazardous wastes that can be accepted under waste codes 17 05 03 and 19 13 01. Currently, these wastes are restricted to sources that display hazardous characteristics owing to having an asbestos content in excess of 0.1%wt/wt. It is therefore proposed to extend the hazardous characteristics acceptable for these wastes to be included other inorganic substances (e.g. metals, metalloids, sulphate, chloride etc). Further details relating to the waste acceptance criteria for the extended waste streams are discussed in **Section 2.3.**

2.2.2 Wastes disposed of at the site under EWC codes 19 13 01 will be from imported sources and the on-site STF.

2.3 Waste Acceptance Criteria for Additional and Extended Waste Streams

2.3.1 All additional and extended waste streams will accord with the criteria for hazardous waste acceptable at landfills for non-hazardous waste pursuant of the Landfill Directive and Schedule 10 of the Environmental Permitting Regulation 2016 (as amended), details of which are re-produced in **Table 1.**

Table 1: Waste Acceptance Criteria for SNRHW for disposal into the monocell

Parameter	Limit Values[1]
Leachable Concentrations (mg/kg L/S 10 l/kg)	
Arsenic	2
Barium	100
Cadmium	1
Chromium (total)	10
Copper	50
Mercury	0.2
Molybdenum	10
Nickel	10
Lead	10
Antimony	0.7
Selenium	0.5
Zinc	50
Chloride	15,000
Fluoride	150
Sulphate	20,000
Total Dissolved Solids[2]	60,000

Parameter	Limit Values[1]
Dissolved Organic Carbon at own pH of pH 7.5-8.0	800
Parameters Determined on the Waste - Total Concentrations	
Total Organic Carbon (%w/w)	5%[3]
pH	>6

[1] - limits relate to granular waste only.
[2] - The values for TDS can be used alternatively to the values for sulphate and chloride
[3] - If this value is not achieved, a higher limit value maybe admitted by the competent authority, provided that the DOC value of 800 mg/kg is achieved at L/S = 10 l/kg, either at the material's own pH or at a pH value between 7,5 and 8,0.

2.3.2 Wastes from the on-site STF will consist of wastes with residual contamination following the reduction/removal of hydrocarbons in the treatment process.

2.3.3 Note, it is not proposed to increase the annual throughput for the monocell above the current limit of 50,000 tonnes.

2.4 Changes to the Treatment of Monocell Waters/Leachate

2.4.1 Rain flaps are currently installed on the existing sidewall liner on which the monocell is being developed. Surface water diverted by these rain flaps flow to the existing surface water lagoon for subsequent testing and discharge.

2.4.2 Surface waters from operational areas of the monocell and waters that infiltrate the waste are collected in a sump located on the western edge of the monocell. The surface of the waste deposits are graded to shed water towards the western edge of the cell where a side-riser extraction system, comprising a 450mm Ø perforated pipe with gravel and geotextile surround buried as the waste as levels raise is used to allow waters to drain to the sump and enable their subsequent extraction. The approved conceptual design of the water management system is presented in **Drawing No. BF4858/2/002.** The side-riser has and will continue to be constructed in 6m sections, extended as the height of the waste deposits demand.

2.4.3 Due to the acceptance of asbestos wastes and inert soils for cover requirements, surface water managed from the operational areas of the monocell is not significantly contaminated, with the exception for the potential for asbestos fibres. Testing to date has confirmed that fibres are not present in the water and treatment has not therefore been required. Similarly testing has also confirmed that the waters have been suitable for discharge to surface water. Only where testing would have confirmed additional (chemical) contamination of these waters, would they have been discharged to sewer, or pre-treated in the existing LTP prior to discharge to sewer.

2.4.4 The introduction of additional/alternative wastes streams with higher leachable thresholds presents a higher risk potential to the environment. On this basis all waters will be directed to the onsite LTP prior to discharge to sewer.

3.0 TECHNICAL CONSIDERATIONS

3.1 Leachate Management and Hydrogeological Risk

Leachate Treatment

3.1.1 Treatment of leachate at the Site is undertaken using a Sequence Batch Reactor (SBR). The leachate treatment plant is capable of treating up to 432 m^3/day, however in practice the ammonia loadings currently allow for approximately 275m^3/day.

3.1.2 The SBR maintains and grows a microbial floc (sludge). Leachate and oxygen are fed into the sludge at a rate which allows suitable bacteria to grow and metabolise polluting components of leachate. The main objective of the plant is to reduce ammoniacal nitrogen, however, there is no specific condition within the original trade effluent consent relating to ammoniacal-nitrogen.

3.1.3 Notwithstanding this, the trade effluent carrier has informed Biffa that they did not want the ammoniacal-nitrogen concentrations to be greater than 40mg/l.

3.1.4 The process also results in other beneficial effects including:

- Reduction of dissolved organic matter measured by BOD and COD.
- Reduction of dissolved methane to safe levels for sewer discharge.
- Removal of sulphides.
- Significant reduction of odours.

3.1.5 Each SBR works to a pre-programmed cycle, which operates as follows:

- Each SBR has an inner and outer tank. The outer tank is aerated for 24 hours. Leachate is fed into the outer tank at predetermined intervals for a set amount of time.
- At set intervals (currently 3 daily cycles) the value will open and the inner tank will fill up. The inner tank is not aerated, the sludge settles to the bottom and the clear effluent is decanted to the sewer pipeline;
- The sludge is then transferred back into the outer tank;
- The effluent is pumped to sewer and is then gravity fed down the pipeline, in accordance with the trade effluent consent issued by Welsh Water plc, a copy of which is included within **Appendix 3**.

Leachate Quality Review

3.1.6 A comparison of the potential leachate source term of the revised wastes streams to be deposited in the monocell to that of the leachate source term within the non-hazardous landfill cells (between 2014-2019) and the sewer discharge limits is presented in **Table 2**. Full datasets of the existing non-hazardous leachate source term are presented in **Appendix 4.**

Table 2: Comparative summary of SNRHW and non-hazardous waste source terms and sewer discharge limits

Parameter	Sewer Discharge Limit (mg/l)	Non-Hazardous Waste Source Term (2014-2019) [Mean/Max] (mg/l)	Equivalent Maximum Leachable Concentration of Future Monocell Wastes (mg/l)	Drinking Water Standard / Freshwater EQS[1] (mg/l)
Arsenic	2 mg/l	0.18 / 1.02	0.2	0.01 / 0.05
Barium	N/S	1.4 / 4.81	10	N/S
Cadmium	2 mg/l	0.00073 / 0.0033	0.1	0.005 / 0.00045[2]

Parameter	Sewer Discharge Limit (mg/l)	Non-Hazardous Waste Source Term (2014-2019) [Mean/Max] (mg/l)	Equivalent Maximum Leachable Concentration of Future Monocell Wastes (mg/l)	Drinking Water Standard / Freshwater EQS[1] (mg/l)
Chromium (total)	2 mg/l	0.217 / 0.717	1	0.05 / 0.032
Copper	2 mg/l	0.18 / 3.49	5	2.0 / (0.001[3])
Mercury	N/S	<0.0002	0.02	0.00007
Molybdenum	2 mg/l	0.02 / 0.157	1	N/S
Nickel	2 mg/l	0.2 / 0.39	1	0.02 / 0.034
Lead	2 mg/l	0.014 / 0.144	1	0.01 / 0.014
Antimony	2 mg/l	0.015 / 0.108	0.07	0.005 / N/S
Selenium	2 mg/l	0.051 / 0.367	0.05	0.01 / N/S
Zinc	2 mg/l	0.24 / 3.83	5	N/S / (0.0109[3])
Chloride	N/S	3,920 / 7,960	1,500	250
Fluoride	N/S	3.8 / 10.8	15	1.5 / 3[2]
Sulphate	1,000	75 / 933	2,000	N/S / 400

Statistical Outliers Removed; N/S – none specified
[1] - Maximum Allowable Concentration specified where available, otherwise annual average threshold used. Assumes for discharge of untreated sewer discharge during operation of storm overflow to fluvial systems.
[2] - based on lowest MAC where variable standards are specified based on calcium carbonate concentrations
[3] - standard based on bioavailable fraction of pollutant

3.1.7 The potential leachate source term concentrations for the monocell presented in **Table 2** represents the potential worst-case (maximum) concentrations of any individual waste source based on the waste acceptance criteria presented in **Table 1**. However, it should be recognised that the deposits will comprise waste from a variety of sources each consisting of varying leachate source term characteristics. Upon deposit in the cell, the bulk source term concentration generated will be diluted below these maximum leachable threshold values. Of the substances listed the following broad observations are made:-

- The maximum leachable concentrations of arsenic, antimony and selenium are less than the effluent discharge consent limits and the maximum concentrations recorded in the leachate produced by the non-hazardous waste landfill between 2014 and 2019;
- The maximum leachable concentration of chloride is more than 5 times lower than the maximum leachate concentration recorded in the non-hazardous waste landfill between 2014 and 2019. No limit is listed in the effluent discharge consent for his substance;
- The maximum leachable concentrations of cadmium, chromium, lead, molybdenum and nickel are less than the effluent discharge consent limits, but greater than the maximum concentrations recorded in the non-hazardous waste landfill between 2014 and 2019;
- The maximum leachable concentrations of copper, zinc and sulphate are greater than the effluent discharge consent limits and maximum recorded concentrations in leachate recorded in the non-hazardous waste landfill between 2014 and 2019;
- The maximum leachable concentrations for barium, fluoride and mercury are greater than the maximum recorded concentrations in leachate recorded in the non-hazardous waste landfill between 2014 and 2019.

3.1.8 However, in real terms, the leachable concentrations of each substance will vary for each waste source, with the bulk leachate chemistry being significantly less than the limit values. Moreover, as discussed in **Section 2.4,** the existing water

collection system installed in the monocell also supports the management of water that runs off the surface of the wastes deposits. These waters will be significantly less contaminated than any waters that infiltrate the wastes. These waters will subsequently mix with any waters that have infiltrated the wastes deposits and further reducing the bulk chemistry of the waters managed within the monocell.

3.1.9 It is also worth noting that prior 2004 the landfill original operated as a co-disposal facility in which the source term concentrations of special/hazardous wastes are likely to have been significantly greater than those to be displayed by the non-hazardous wastes proposed for deposit in the monocell. Historic deposits of special/hazardous wastes will therefore still have an influence on the leachate source term currently being managed at the site, however as can be seen from the quality of the leachate managed between 2014 and 2016 the bulk leachate chemistry is not as potent as that of the leachable concentrations from the individual special/hazardous wastes streams that would have been deposited at the site prior to 2004.

Potential Influence on Existing Leachate Management and Discharge

3.1.10 Of the substances in which limits are imposed within the effluent discharge consent only the waste acceptance limits for copper, zinc and sulphate would potentially lead to exceedances. As discussed above, the leachable concentrations presents in **Table 2** are representative of maximum leachable concentrations of the future wastes proposed to be deposited in the monocell. Taking into account the variable chemistry of the wastes to be deposited and the associated reduced bulk chemistry, together with dilution with run-off from the waste surface within the sump of the water collection system installed in the monocell, the bulk source term concentrations of waters within the monocell are likely to be significantly less than the equivalent leachate concentrations derived from the waste acceptance limits. Moreover, as the treatment process consists of a batch reactor process, water extracted from the monocell will also be mixed with leachate from the non-hazardous waste deposits for treatment, thus providing further dilution prior to treatment and discharge. On this basis it is not considered that the potential change in water quality within the monocell will significantly influence the leachate treatment and discharge regime at the site.

Hydrogeological Risk

3.1.11 The monocell is constructed on a section of the engineered sidewall of the site, the base of which is ~70m above that of the landfill itself, which in turn is at least 30m above that of groundwater within the underlying aquifer. The Hydrogeological Risk Assessment carried out for the landfill to date has quantified through probabilistic modelling that the potential risk of the discernible inputs of hazardous substances and the input of non-hazardous pollutants that could cause pollution is low.

3.1.12 The relevance of the current HRA in the context of the proposed variation of wastes for disposal in the monocell is largely based on the selection of cadmium (formerly a hazardous substance) as a priority, surrogate metal species owing to the associated risk factor of 740 calculated based on the ratio of the maximum concentration recorded in leachate to date of 0.74 mg/l to that of an Environmental Assessment Level of 0.0001mg/l. The model predicted a theoretical peak concentration in groundwater of $1x10^{-40}$ mg/l (excluding baseline concentrations), which illustrates that there is a significant attenuation provided by the lining system, unsaturated zone and aquifer to limit the risk to groundwater.

3.1.13 Taking into considering the elevation of the monocell relative to basal level of the landfill, the attenuation provided by the lining system and unsaturated zone, and the dilution available in the aquifer the leachable concentrations of the proposed wastes to be deposited in the monocell will not present a significant increased risk to controlled waters.

3.2 Landfill Gas Risk Assessment Review

3.2.1 The additional wastes to be deposited in the monocell will be non-degradable in nature, as are the current wastes permitted for deposit in the monocell. This change will not therefore alter the gas generation potential of the landfill or impact upon the management of landfill gas at the site.

3.3 Stability Risk Assessment Review

3.3.1 The proposed permit variation to enable to disposal of additional waste types into the Stable Non-Reactive Hazardous Waste (SNRHW) cell should not impact on the conclusions of the existing SRA.

3.3.2 The cell is currently only permitted to accept asbestos wastes and asbestos contaminated wastes (including asbestos contaminated soils from construction and demolition activities) and asbestos contaminated soils from the on-site Soils Treatment Facility. However, in terms of shear strength, permeability, and stiffness, the proposed variation to widen the waste types to include the additional waste types should not require an amendment to the range of density, shear strength, permeability and stiffness already allowed for, as specified in Table SRA7 of the SRA Review (Doc. Ref. BF4857/SRA (Revision 1) approved as part of the original application in 2014 to add the monocell to the permitted activities. Widening the waste codes to include fly & bottom ashes, gas cleaning residues, machine sludges, shotblast, absorbents, and filter materials would not significantly amend the conservative shear strength (phi' of 25 degrees and c' of 5kN/m2) or other soil values already adopted, as outlined below:

3.3.3 A range of densities were allowed for previously (between 17kg/m³ and 19kg/m³), and this range already covers the highest density likely to be encountered for these waste types. A reduction in density would increase the factors for stability.

3.3.4 The same is also true of the permeability, where the value selected ($k=1x10^{-8}$ m/s) is the lowest value likely to be encountered for these waste types. A higher value for permeability would reduce the time taken for excess pore water pressure to dissipate, increasing the factors of safety for stability.

3.3.5 The waste in-fill timings were based on the worst-case rate of input of 50,000 tonnes per annum, and there is no proposal to increase this. Therefore, for the stiffness values, the model adopted for the previous assessment (allowing for an increase in stiffness with depth) would not require an amendment as a result of the additional waste types. For the assessment of the integrity of the separation bund, the previous conclusion (and monitoring requirements) are still valid.

3.3.6 The additional wastes would only comprise non-degradable waste materials that meet with SRNHW WAC (refer to **Section 2.3**), and will not include biodegradable wastes. For this reason, there should not be any requirement to consider any additional potential aspects of instability that would otherwise arise as a result of partial landfill gas pressures.

3.3.7 There is no proposed variation to the geometry (height/depth) and in-filling is only proposed up to the maximum approved height previously assessed.

3.3.8 A separation bund is still required (and proposed) in order to provide a minimum 2m thick barrier between the stable non-reactive hazardous waste (SNRHW) and the non-hazardous waste. This separation bund (each lift being 1.4m high with a minimum 2m wide crest, and 1 in 1 gradient side-slope) for the SNRHW cell is still proposed to be constructed from suitable materials and will be constructed progressively with the placement of waste in the SNRHW cell and surrounding non-hazardous waste.

3.3.9 The assessments indicated that the bund (cover material) will move over the lifetime of the cell due to differential settlement between the non-hazardous (bio-degradable) waste and the inert (non-biodegradable) waste, and the additional waste types will not affect this, or the requirement to monitor the movement, as outlined in the SRA approved under the 2014 application.

3.3.10 The critical states (design scenarios) considered as part the construction of the SNRHW cell will still be:

- During waste deposition operations, where the amount of non-hazardous waste buttressing the separation bund will determine the stability of the SNRHW cell;
- Following the completion of landfilling, where significant loads as a result of negative skin friction/settlement (and variable lateral loads) will exist across the cell lining system; and
- Following the completion of landfilling where differential settlement of the non-hazardous wastes and stable non-reactive hazardous waste may cause movement and strain in the separation bund.

3.3.11 However, the additional waste types are not anticipated to require any significant amendment to the modelling values already adopted, and the following conclusions may still be relied upon:

- The stability of the whole system including the different waste types, separation bund, basal liner and side-slope liner at various stages of waste deposit and bund construction;
- The integrity of the basal and side-slope lining system during and post-waste (worst-case) placement; and
- The long-term integrity assessment of the separation bund after completion of the landfill site.

4.0 OTHER CONSIDERATIONS

4.1 Financial Provision

4.1.1 The scope of this application to vary the permit does not alter the existing plans for closing the site.

4.2 Amenity Risk Assessment

4.2.1 The additional waste types are not considered to pose any significant increased risk to local amenity through the potential emissions of dust, odour, noise, mud or debris (including litter), nor will it increase the potential risks from pests or scavengers.

4.3 Closure Plan

4.3.1 The scope of this application to vary the permit does not alter the existing plans for closing the site.